

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CALLAWAY GOLF COMPANY,

Plaintiff,

v.

ACUSHNET COMPANY,

Defendant.

C. A. No. 06-91 (SLR)

**DECLARATION OF THOMAS L. HALKOWSKI IN SUPPORT OF
PLAINTIFF CALLAWAY GOLF COMPANY'S OPPOSITION
TO DEFENDANT ACUSHNET COMPANY'S MOTION TO
STAY LITIGATION PENDING *INTER PARTES*
REEXAMINATION BY THE U.S. PATENT OFFICE**

I, Thomas L. Halkowski, declare as follows:

1. I am a member of Fish & Richardson P.C., counsel of record in this action for Callaway Golf Company ("Callaway"). I am a member of the Bar of the State of Delaware and am admitted to this Court. I have personal knowledge of the matters stated in this declaration and would testify truthfully to them if called upon to do so.

2. Attached as Exhibit A is a true and correct copy of an October 19, 2000 Fortune Brands News Release, <http://www.fortunebrands.com/news/ReleaseDetail.cfm?ReleaseID=26156&ReleaseType=Earnings>.

3. Attached as Exhibit B is a true and correct copy of an August 22, 2005 e-mail from Alan Grimaldi to Frank Scherkenbach.

4. Attached as Exhibit C is a true and correct copy of an August 26, 2005 letter from Michael Zeliger to Magistrate Judge Mary Pat Thyng.

5. Attached as Exhibit D is a true and correct copy of a November 27, 2002 Memorandum Order in the matter of *Arthrocare Corporation v. Smith & Nephew, Inc.*, Case No. 01-504 SLR.

6. Attached as Exhibit E is a true and correct copy of an excerpt from the January 13, 2006 Request for *Inter Partes* Reexamination of U.S. Patent No. 6,210,293.

7. Attached as Exhibit F is a true and correct copy of an excerpt from the January 13, 2006 Request for *Inter Partes* Reexamination of U.S. Patent No. 6,503,156.

8. Attached as Exhibit G is a true and correct copy of an excerpt from the January 13, 2006 Request for *Inter Partes* Reexamination of U.S. Patent No. 6,506,130.

9. Attached as Exhibit H is a true and correct copy of an excerpt from the January 13, 2006 Request for *Inter Partes* Reexamination of U.S. Patent No. 6,595,873.

10. Attached as Exhibit I is a true and correct copy of U.S. Patent No. 5,885,172, dated March 23, 1999.

11. Attached as Exhibit J is a true and correct copy of a September 10, 1998 Information Disclosure Statement regarding Application No. 08/863,788.

12. Attached as Exhibit K is a true and correct copy of a September 10, 1998 List of References Cited by Applicant regarding Application No. 08/863,788.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 19th day of May, 2006, at Wilmington, Delaware.

/s/ Thomas L. Halkowski
Thomas L. Halkowski

CERTIFICATE OF SERVICE

I hereby certify that on May 19, 2006, I electronically filed **DECLARATION OF THOMAS L. HALKOWSKI IN SUPPORT OF PLAINTIFF CALLAWAY GOLF COMPANY'S OPPOSITION TO DEFENDANT ACUSHNET COMPANY'S MOTION TO STAY LITIGATION PENDING *INTER PARTES* REEXAMINATION BY THE U.S. PATENT OFFICE** with the Clerk of Court using CM/ECF which will send electronic notification of such filing(s) to the following Delaware counsel. In addition, the filing will also be sent via hand delivery:

Richard L. Horwitz
David E. Moore
Potter Anderson & Corroon LLP
Hercules Plaza, 6th floor
1313 N. Market Street
Wilmington, DE 19801

Attorneys for Defendant
ACUSHNET COMPANY

I hereby certify that on May 19, 2006, I have mailed by United States Postal Service, the document(s) to the following non-registered participants:

Joseph P. Lavelle
Andrew R. Sommer
Howrey LLP
1299 Pennsylvania Avenue, N.W.
Washington, DC 20004

Attorneys for Defendant
ACUSHNET COMPANY

/s/ Thomas L. Halkowski
Thomas L. Halkowski

Exhibit A



ANNUAL REPORT

Symbol: FO

Listed: NYSE

May 19, 2006 2:56 PM | Stock Price: 7

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FORTUNE BRANDS DELIVERS STRONG THIRD QUARTER RESULTS

Diluted EPS Before Charges Up 21% to a Record: Company Reaffirms Expectation of Solid Double-Digit EPS Growth for Full Year

Lincolnshire, IL, October 19, 2000 - Fortune Brands, Inc. (NYSE: FO, www.fortunebrands.com), a leading consumer brands company, today announced record third quarter earnings propelled by top-line sales growth of 5%, and successful brand building and shareholder value initiatives. Diluted EPS before charges reached 51 cents, up 21% from 42 cents a year ago.

Robust demand for the company's kitchen and bath cabinet and super-premium spirits brands, and strong sales for market leading brands including Moen, Master Lock, FootJoy and Jim Beam, contributed to the company's performance. The company increased return on equity by more than 100 basis points.

"Fortune Brands delivered another quarter of strong results, supported by solid fundamentals and a strategy sharply focused on maximizing shareholder value," said Chairman & Chief Executive Officer Norm Wesley. "We're building our leading consumer brands with innovative new products, creative marketing, high-impact advertising and a commitment to unsurpassed customer service. We're executing our major supply-chain restructuring program to increase operating efficiencies, strengthen competitiveness and generate savings. To drive shareholder value even higher, we're improving returns, repurchasing shares, paying an attractive dividend and progressing the strategic evolution of our business portfolio." The company announced on October 9th that it is exploring strategic options for its office products unit.

"We believe the strength of our brands and our sustained operational improvements position Fortune Brands well to navigate ongoing challenges related to foreign exchange rates, interest rates and energy costs," Wesley added. "Fortune Brands remains on track to deliver solid double-digit earnings per share growth for the full year 2000. For 2001 and beyond, our key goals continue to be double-digit EPS growth and improved returns."

Third quarter financial highlights include:

- Record sales +5% to \$1.4 billion, on a reported and comparable basis
- Record operating company contribution +5% to \$204 million (+6% comparable)
- Corporate expense reduced by 46%
- Diluted EPS +21% to 51 cents
- Excluding the impact of adverse foreign exchange, diluted EPS would have been +26% to 53 cents
- Diluted cash earnings were even higher at 63 cents per share
- Dividend increased 4 cents to an indicated annual rate of 96 cents

The company also announced that its year 2000 share repurchases now total 8.3 million shares. Since January 1999, Fortune Brands has bought back a

total of 19.3 million shares, reducing shares outstanding by more than 11%.

In the third quarter, the company recorded net restructuring and non-recurring charges of \$7.7 million, related primarily to ongoing supply chain restructuring initiatives. Including these charges, reported net income was \$73.3 million, or 46 cents per diluted share.

Operational highlights include:

- With strong performance from every major brand, the home products business generated another record quarter of solid double-digit sales and contribution growth. Vigorous demand from wholesale, dealer and home center accounts drove double-digit sales increases for the cabinet brands, led by Aristokraft, Schrock and Decora (combined #2 in North America). Innovative Moen products continued to drive growth for the #1 faucet brand in North America. Successful new products, record back-to-school demand and supply chain restructuring benefits boosted performance for Master Lock. New products and aggressive promotions contributed to another strong sales increase for Waterloo, the #1 manufacturer of tool storage products.
- Spirits and wine contribution increased to a record and was up 9% on a comparable basis. While reported sales were off 4%, comparable sales were up 4%, excluding foreign exchange, excise taxes and the impact of sales through the Maxxium international joint venture - which are now net of distribution expense and excise taxes. Strong brand investment in Jim Beam, the world's #1 bourbon, and the ongoing success of DeKuyper cordials (#1 in the U.S.) contributed to the underlying performance. Increasing demand for Knob Creek, the #1 small batch bourbon, Vox ultra-premium vodka and Geyser Peak wines drove rapid growth for the company's high-margin super-premium spirits and premium wines. International distribution through Maxxium continues to generate significant cost savings.
- The golf products business performed in line with expectations. Sales and contribution trailed the year-ago quarter as lower golf club results and sustained investments to defend golf ball share more than offset gains in golf shoes and accessories. Titleist - the number one ball in golf - maintained its overwhelming market leadership position. Titleist accelerated its golf ball technology and performance leadership with the launch of the next generation Tour Distance SF and the initial PGA Tour success of the breakthrough multi-component Titleist Pro V1, scheduled for consumer introduction in 2001. With the Professional, Tour Prestige and Pro V1 models, Titleist is now the #1 ball of choice in both the wound and solid construction categories on the PGA Tour. FootJoy - the #1 shoe and #1 glove in golf - achieved record market share in the U.S. on and off-course golf shoe channels on the strength of successful new products and sustained sales momentum.
- Sales for the office products business increased 7%, and were up 4% on a comparable basis. While comparable contribution was off slightly, adverse foreign exchange pushed results down 8%. The challenges of a competitive pricing environment in the U.S. offset improved performance in international markets.

* * *

Fortune Brands, Inc. is a consumer products company with annual sales exceeding \$5.5 billion. Its operating companies have premier brands and leading market positions in home products, office products, golf equipment and spirits and wine. Home brands include Moen faucets, Master locks and Aristokraft and Schrock cabinets sold by units of MasterBrand Industries, Inc. Office brands include Day-Timer, Swingline, Kensington and Wilson Jones sold by units of ACCO World Corporation. Acushnet Company's golf brands include Titleist, Cobra and FootJoy. Major spirits and wine brands sold by units of Jim Beam Brands Worldwide, Inc. include Jim Beam and Knob Creek bourbons, DeKuyper cordials, Whyte & Mackay Scotch and Geyser Peak and Canyon Road wines. Fortune Brands, headquartered in Lincolnshire, Illinois, is traded on the New York Stock Exchange under the ticker symbol FO and is included in the S&P 500 Index.

To hear an Internet replay of the company's quarterly earnings conference call presentation, or to receive company news releases by e-mail, please visit www.fortunebrands.com.

* * *

This press release contains statements relating to future results, which are forward-looking statements as that term is defined in the Private Securities Litigation Reform Act of 1995. Readers are cautioned that these forward-looking statements speak only as of the date hereof. Actual results may differ materially from those projected as a result of certain risks and uncertainties, including but not limited to changes in general economic conditions, foreign exchange rate fluctuations, changes in interest rates, competitive product and pricing pressures, trade consolidations, the impact of excise tax increases with respect to distilled spirits, regulatory developments, the uncertainties of litigation, changes in golf equipment regulatory standards, the impact of weather, particularly on the home products and golf brand groups, expenses and disruptions related to shifts in manufacturing to different locations and sources, challenges in the integration of acquisitions and joint ventures, risks associated with the Company's implementation of strategic options for ACCO World Corporation, as well as other risks and uncertainties detailed from time to time in the Company's Securities and Exchange Commission filings.

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Exhibit B

From: Grimaldi, Alan [mailto:GrimaldiA@howrey.com]

Sent: Monday, August 22, 2005 3:13 PM

To: Frank Scherkenbach; Grimaldi, Alan

Subject: RE: Draft letter to Magistrate Judge Thygne

please change as follows: call me to make sure the changes come through-thanks
Alan

-----Original Message-----

From: Frank Scherkenbach [mailto:Scherkenbach@fr.com]

Sent: Friday, August 19, 2005 11:20 AM

To: grimaldia@howrey.com

Cc: Frank Scherkenbach; SteveM@callawaygolf.com; Peter Arturi; Michael Zeliger

Subject: Draft letter to Magistrate Judge Thygne

Alan: I have drafted below a letter to be sent to Magistrate Judge Thygne in Delaware, regarding the mediation necessary to fulfill the final step in the parties' ADR process. Please look it over and let me have your suggestions. We would like to send this within the next week or so.

Frank

Dear Judge Thygne:

I write on behalf of The Top-Flite Golf Company and its parent Callaway Golf Company (collectively "Callaway Golf"), and the Acushnet Company to seek your assistance in resolving another golf ball dispute ~~delete~~ (with Acushnet Company) add "between the companies".

There was a prior case in this court between Top-Flite's predecessor, Spalding & Evenflo Companies ("Spalding"), and Acushnet Company. That prior case was a patent, false advertising and contract dispute about certain golf balls. It was resolved by settlement in 1996. A copy of the confidential settlement agreement is attached to this letter.

As the Court will see from both paragraph 19 of the settlement agreement ("Dispute Resolution") and the stipulated dismissals filed in the prior case (attached as exhibits B and C to the settlement agreement), this Court retained jurisdiction over the parties for the purposes of resolving "any and all disputes arising out of the Settlement Agreement in accordance with the terms of the Settlement Agreement." Paragraph 19.1 of the agreement provides that "[a]ny dispute arising out of or relating to patents" is subject to the dispute resolution procedure; the final step in that dispute resolution procedure is a mediation before Your Honor, if Your Honor is available to assist.

I therefore write to request the Court's assistance in overseeing a mediation of the current golf ball dispute between Callaway Golf and Acushnet, which is based on the alleged infringement by Acushnet of several Callaway Golf patents. ~~(~~ Acushnet joins this request . If the Court is available and willing to assist - add-**"after September 19 ,** the parties respectfully request a brief telephone call for the purpose of scheduling a mediation session at the Court's earliest convenience.

This email and any attachments contain information from the law firm of Howrey LLP, which may be confidential. The information is intended to be for the use of the individual or entity named on this email.

If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of the contents is unauthorized. If you receive this email in error, please notify us by reply email immediately so that we can arrange for the removal of this email.

Exhibit C

FISH & RICHARDSON P.C.

Frederick P. Fish
1855-1930

W.K. Richardson
1859-1951

225 Franklin Street
Boston, Massachusetts
02110-2804

Telephone
617 542-5070

Facsimile
617 542-8906

Web Site
www.fr.com

BY HAND DELIVERY

August 26, 2005

Magistrate Judge Mary Pat Thyng
United States District Court, District of Delaware
J. Caleb Boggs Federal Building
844 N. King Street
Room 6100
Lockbox 8
Wilmington, DE 19801

FR

AUSTIN
BOSTON
DALLAS
DELAWARE
NEW YORK
SAN DIEGO
SILICON VALLEY
TWIN CITIES
WASHINGTON, DC

Re: Callaway Golf / The Acushnet Company

Dear Judge Thyng:

I write on behalf of The Top-Flite Golf Company and its parent Callaway Golf Company (collectively "Callaway Golf"), and the Acushnet Company to seek your assistance in resolving another golf ball dispute between the companies.

There was a prior case in this court between Top-Flite's predecessor, Spalding & Evenflo Companies ("Spalding"), and the Acushnet Company. That prior case was a patent, false advertising and contract dispute about certain golf balls. It was resolved by settlement in 1996. A copy of the confidential settlement agreement is attached to this letter.

As the Court will see from both paragraph 19 of the settlement agreement ("Dispute Resolution") and the stipulated dismissals filed in the prior case (attached as exhibits B and C to the settlement agreement), this Court retained jurisdiction over the parties for the purposes of resolving "any and all disputes arising out of the Settlement Agreement in accordance with the terms of the Settlement Agreement." Paragraph 19.1 of the agreement provides that "[a]ny dispute arising out of or relating to patents" is subject to the dispute resolution procedure; the final step in that dispute resolution procedure is a mediation before Your Honor, if Your Honor is available to assist.

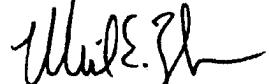
I therefore write to request the Court's assistance in overseeing a mediation of the current golf ball dispute between Callaway Golf and Acushnet, which is based on the alleged infringement by Acushnet of several Callaway Golf patents. If the Court is available and willing to assist after September 19, 2005, the parties respectfully request a brief telephone call for the purpose of scheduling a mediation session at the Court's earliest convenience.

FISH & RICHARDSON P.C.

Magistrate Judge Mary Pat Thyng
August 26, 2005
Page 2

If you have any questions, please do not hesitate to contact me at (617) 956-5925, Frank Scherkenbach at (617) 521-7883 (lead counsel for Callaway Golf) or Alan Grimaldi at (202) 383-6989 (lead counsel for the Acushnet Company).

Very truly yours,



Michael E. Zeliger

/mbo

Enclosure

cc: Frank E. Scherkenbach
Alan Grimaldi

21154854 (3).doc

FISH & RICHARDSON P.C.

225 Franklin Street
Boston, Massachusetts
02110-2804

Telephone
617 542-5070

Facsimile
617 542-8906

Date August 26, 2005

To Alan M. Grimaldi, Esq.
Howrey LLP
1299 Pennsylvania Avenue, N.W.
Washington, DC 20004
Telephone: (202) 383-6989

Facsimile number 16656-00153531 / (202) 383-6610

From Michael E. Zeliger

Re Callaway Golf/Acushnet Mediation

**Number of pages
including this page** 3

Message

NOTE: This facsimile is intended for the addressee only and may contain privileged or confidential information. If you have received this facsimile in error, please immediately call us collect at 617 542-5070 to arrange for its return. Thank you.

* * * COMMUNICATION RESULT REPORT (AUG. 26. 2005 11:51AM) * * *

TTI (4) FISH&RICHARDSON_6175428906

TRANSMITTED/STORED AUG. 26. 2005 11:49AM
FILE MODE OPTION

7040 MEMORY TX

ADDRESS

274#16656#00153531#12023836610

RESULT

PAGE

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REASON FOR ERROR
E-1) HANG UP OR LINE FAIL
E-3) NO ANSWERE-2) BUSY
E-4) NO FACSIMILE CONNECTION

FISH & RICHARDSON P.C.

225 Franklin Street
Boston, Massachusetts
02110-2804Telephone
617 542-5070Facsimile
617 542-8906Web Site
www.fr.com

Date August 26, 2005

To Alan M. Grimaldi, Esq.
Howrey LLP
1299 Pennsylvania Avenue, N.W.
Washington, DC 20004
Telephone: (202) 383-6989

Facsimile number 16656-00153531 / (202) 383-6610

From Michael E. Zeliger
Re Callaway Golf/Acushnet Mediation

Number of pages
including this page 3

Message

NOTE: This facsimile is intended for the addressee only and may contain privileged or confidential information. If you have received this facsimile in error, please immediately call us collect at 617 542-5070 to arrange for its return. Thank you.

Exhibit D

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

ARTHROCARE CORPORATION,)
Plaintiff,)
v.) C.A. No. 01-504-SLR
SMITH & NEPHEW, INC.,)
Defendant.)

MEMORANDUM ORDER

At Wilmington this 27th day of November, 2002; having reviewed the papers submitted by the parties in connection with various motions filed by defendant;

IT IS ORDERED that defendant's motion to stay pending reexamination (D.I. 187) is denied, for the reasons that follow:

1. The United States Court of Appeals for the Federal Circuit recognizes that "[c]ourts have inherent power to manage their dockets and stay proceedings . . . , including the authority to order a stay pending conclusion of a PTO reexamination."

Ethicon, Inc. v. Quiqq, 849 F.2d 1422, 1426-27 (Fed. Cir. 1988)

(citations omitted). Courts clearly have the authority to order their cases to trial.

2. The Federal Circuit also has recognized that patent litigation in a district court and reexamination proceedings

before the PTO do not implicate a "precise duplication of effort" because "litigation and reexamination are distinct proceedings, with distinct parties, purposes, procedures, and outcomes." Id. at 1427.

3. Given the court's view that its primary purpose is to manage litigation in an expeditious manner in order to create an appropriate record (through motion practice or trial) for review by the Federal Circuit, the court generally will not stay its cases pending reexamination proceedings absent extraordinary circumstances. In this case, where only one of the three patents is undergoing reexamination, where the patents at issue relate to an evolving and highly competitive market, and where the reexamination proceedings to date have not been conducted with what the court would consider "special dispatch", the court declines to find this an exceptional case warranting a stay. The court understands that, prior to trial, the PTO may issue rulings that will need to be considered, thus causing some inefficiencies in the pretrial and trial process. Nevertheless, the court concludes that such inefficiencies are an inherent byproduct of concurrent litigation and reexamination and, therefore, do not constitute exceptional circumstances justifying a stay of the litigation at bar.

IT IS FURTHER ORDERED that defendant's motion to bifurcate willfulness and damages and to stay discovery (D.I. 107) is granted. Discovery on the issues of willfulness and damages will be stayed until after the verdict on infringement and invalidity has been returned; these issues will be tried to a new jury.

IT IS FURTHER ORDERED that defendant's claim of privilege pertaining to redactions in certain documents (D.I. 190) is denied. The court finds that the information redacted is equivalent to the information required to be included in a privilege log, and thus not privileged information.

IT IS FURTHER ORDERED that defendant's second motion for leave to amend answer and counterclaim (D.I. 111) is granted. However, discovery and trial of defendant's newly added counterclaim for antitrust violations are stayed consistent with the above ruling on the issues of damages and willfulness.

IT IS FURTHER ORDERED that defendant's motion for reargument is denied, as is its motion to strike. (D.I. 160, 172)



United States District Judge

Exhibit E

REQUEST FOR REEXAMINATION OF U.S. PATENT NO. 6,210,293

Attorney Docket No. 00634.0004.RXUS01

Page 3

Reexam Claim Numbers	References Applied Against Claims of the '293 Patent
1-8	Anticipated by United States Patent No. 4,431,193 to R. Dennis Nesbitt ("Nesbitt") (issued Feb. 14, 1984) under 35 U.S.C. § 102(b).
1-8	Obvious over Nesbitt in view of United States Patent No. 4,274,637 to Robert P. Molitor ("Molitor '637") (issued Jun. 23, 1981) under 35 U.S.C. § 103(a).
1-8	Obvious over Nesbitt in view of United States Patent No. 5,334,673 to Shenshen Wu ("Wu") (issued Aug. 2, 1994) under 35 U.S.C. § 103(a).
1-8	Obvious over Nesbitt in view of United States Patent No. 4,674,751 to Robert P. Molitor ("Molitor '751") (issued Jun. 23, 1987) under 35 U.S.C. § 103(a).
1-8	Obvious over United States Patent No. 5,314,187 to James R. Proudfit ("Proudfit") (issued May 24, 1994) in view of Molitor '637 under 35 U.S.C. § 103(a).
1-8	Obvious over Proudfit in view of Wu under 35 U.S.C. § 103(a).
1-8	Obvious over Proudfit in view of Molitor '751 under 35 U.S.C. § 103(a).

Only the Nesbitt and Proudfit patents referenced above were cited during the prosecution of the '293 patent. Molitor '637 was cited against the claims of the great-grandparent application in the '293 patent family, U.S. Patent Application Serial No. 08/070,510.¹ However, the inherent properties of the soft polyurethane disclosed in Molitor '637, relied on herein, were not before the Examiner. The Proudfit patent was originally cited by the examiner in the parent application to the '293 patent, U.S. Patent Application Serial No. 08/870,585.² However, as we will show

¹ Nesbitt was cited by Examiner Graham in an office action dated April 8, 1994. In this office action, Examiner Graham found that the combination of Nesbitt with United States Patent No. 5,068,151 to Nakamura rendered the claims obvious under 35 U.S.C. § 103(a). This rejection was repeated in the grandparent application to the '293 patent, U.S. Patent Application Serial No. 08/556,237 in office actions mailed February 8, 1996 and December 6, 1996.

² Proudfit was cited by Examiner Graham in an office action dated July 8, 1998. In U.S. Pat. App. Serial No. 08/070,510. In this office action, Examiner Graham found that the Proudfit patent rendered the claims obvious under 35 U.S.C. § 103(a). This rejection was repeated in an office action dated December 21, 1998. This rejection was mistakenly withdrawn due to a declaration under 37 C.F.R. § 1.131 that was submitted in copending U.S.

Exhibit F

REQUEST FOR REEXAMINATION OF U.S. PATENT NO. 6,503,156

Attorney Docket No. 00634.0004.RXUS04

Page 3

III. REFERENCES THAT FORM THE BASIS FOR THE REQUEST FOR REEXAMINATION.

A. References that Raise Substantial New Questions of Patentability

The following table sets forth the references relied upon in this Request for *inter partes* Reexamination. Each of the cited references is prior art to the '156 patent based on its respective date under 35 U.S.C. § 102(b), as set forth below.

Reexam Claim Numbers	References Applied Against the Claims of the '156 Patent
1-11	Anticipated by United States Patent No. 4,431,193 to R. Dennis Nesbitt ("Nesbitt") (issued Feb. 14, 1984) under 35 U.S.C. § 102(b).
1-11	Obvious under 35 U.S.C. § 103(a) over Nesbitt in view of United States Patent No. 4,274,637 to Robert P. Molitor ("Molitor '637") (issued Jun. 23, 1981).
1-11	Obvious under 35 U.S.C. § 103(a) over Nesbitt in view of United States Patent No. 5,334,673 to Shenshen Wu ("Wu") (issued Aug. 2, 1994).
1-11	Obvious under 35 U.S.C. § 103(a) over Nesbitt in view of United States Patent No. 4,674,751 to Robert P. Molitor ("Molitor '751") (issued Jun. 23, 1987).
1-11	Obvious under 35 U.S.C. § 103(a) over United States Patent No. 5,314,187 to James R. Proudfit ("Proudfit") (issued May 24, 1994) in view of Molitor '637.
1-11	Obvious under 35 U.S.C. § 103(a) over Proudfit in view of Wu.
1-11	Obvious under 35 U.S.C. § 103(a) over Proudfit in view of Molitor '751.

While each of these references were cited in an information disclosure statement during the prosecution of the '156 patent, none of these references were applied in a rejection against the claims of the '156 patent. Molitor '637 was cited against the claims of U.S. Patent Application

Exhibit G

Reexam Claim Numbers	References Applied Against the Claims of the '130 Patent
1	Anticipated under 35 U.S.C. § 102(b) by United States Patent No. 5,314,187 to James R. Proudfit ("Proudfit") (issued May 24, 1994).
2, 3	Anticipated under 35 U.S.C. § 102(b) by Proudfit and/or obvious under 35 U.S.C. § 103(a) over Proudfit.
1-6	Anticipated under 35 U.S.C. § 102(b) by United States Patent No. 4,431,193 to R. Dennis Nesbitt ("Nesbitt") (issued Feb. 14, 1984) and/or obvious under 35 U.S.C. § 103(a) by Nesbitt in view of United States Patent No. 4,274,637 to Robert P. Molitor ("Molitor '637") (issued Jun. 23, 1981).
1-6	Anticipated under 35 U.S.C. § 102(b) by United States Patent No. 5,803,831 to Sullivan <i>et al.</i> ("Sullivan '831") (issued Sep. 8, 1998).
1-6	Obvious under 35 U.S.C. § 103(a) over Nesbitt in view of United States Patent No. 5,334,673 to Shenshen Wu ("Wu") (issued Aug. 2, 1994).
1-6	Obvious over Nesbitt in view of United States Patent No. 4,674,751 to Robert P. Molitor ("Molitor '751") (issued Jun. 23, 1987) under 35 U.S.C. § 103(a).
4-6	Obvious under 35 U.S.C. § 103(a) over Proudfit in view of Molitor '637.
4-6	Obvious under 35 U.S.C. § 103(a) over Proudfit in view of Wu.
4-6	Obvious under 35 U.S.C. § 103(a) over Proudfit in view of Molitor '751.

While each of these references were cited in an information disclosure statement during the prosecution of the '130 patent, none of these references were applied in a rejection against the claims of the '130 patent. While Molitor '637 was cited against the claims of the great-great grandparent application in the '130 patent family, U.S. Patent Application Serial No. 08/070,510,¹ the inherent properties of the soft polyurethane disclosed in Molitor '637, relied on

¹ Nesbitt was cited by Examiner Graham in an office action dated April 8, 1994. In this office action, Examiner Graham found that the combination of Nesbitt with United States Patent No. 5,068,151 to Nakamura rendered the claims obvious under 35 U.S.C. § 103(a). This rejection was repeated in U.S. Patent Application Serial No. 08/556,237 in office actions mailed February 8, 1996 and December 6, 1996.

Exhibit H

Reexam Claim Numbers	References Applied Against the Claims of the '873 Patent
1-6	Anticipated by United States Patent No. 4,431,193 to R. Dennis Nesbitt ("Nesbitt") (issued Feb. 14, 1984) under 35 U.S.C. § 102(b).
1-6	Obvious under 35 U.S.C. § 103(a) over Nesbitt in view of United States Patent No. 4,274,637 to Robert P. Molitor ("Molitor '637") (issued Jun. 23, 1981).
1-6	Obvious under 35 U.S.C. § 103(a) over Nesbitt in view of United States Patent No. 5,334,673 to Shenshen Wu ("Wu") (issued Aug. 2, 1994).
1-6	Obvious under 35 U.S.C. § 103(a) over Nesbitt in view of United States Patent No. 4,674,751 to Robert P. Molitor ("Molitor '751") (issued Jun. 23, 1987).
1-6	Obvious under 35 U.S.C. § 103(a) over United States Patent No. 5,314,187 to James R. Proudfit ("Proudfit") (issued May 24, 1994) in view of Molitor '637.
1-6	Obvious under 35 U.S.C. § 103(a) over Proudfit in view of Wu.
1-6	Obvious under 35 U.S.C. § 103(a) over Proudfit in view of Molitor '751.

The Proudfit patent was applied in combination with U.S. Patent No. 5,068,151 to Nakamura against the originally-filed claims of the '873 patent in an office action dated July 3, 2001. Nesbitt in combination with Wu and U.S. Patent No. 4,884,814 to Sullivan was first applied against claims 1 and 3 in an office action dated June 19, 2002. The remaining prior art references were cited in an information disclosure statement and were initialed by the Examiner.

B. Summary of the Substantial New Questions of Patentability

In summary this request raises at least the following substantial new questions of patentability that were not previously considered by the PTO: (1) Nesbitt's incorporation by reference of Molitor '637 anticipates all claims of the '873 patent; (2) inherent properties of Molitor '637's Estane polyurethane were not before the Examiner and hence not considered; (3) Proudfit was improperly antedated in a previous application although it anticipates and/or renders

Exhibit I



United States Patent [19]

Hebert et al.

[11] Patent Number: 5,885,172
 [45] Date of Patent: Mar. 23, 1999

[54] MULTILAYER GOLF BALL WITH A THIN THERMOSET OUTER LAYER

[75] Inventors: Edmund A. Hebert, North Dartmouth, Mass.; William E Morgan, Barrington, R.I.; Dean Snell, Oceanside, Calif.

[73] Assignee: Acushnet Company, Fairhaven, Mass.

[21] Appl. No.: 863,788

[22] Filed: May 27, 1997

[51] Int. Cl.⁶ A63B 37/08; A63B 37/12; A63B 37/06

[52] U.S. Cl. 473/354; 473/365; 473/363; 473/376; 473/378

[58] Field of Search 473/377, 378, 473/384, 354, 363, 365, 374, 376

[56] References Cited

U.S. PATENT DOCUMENTS

3,147,324	9/1964	Ward	264/254
3,177,280	4/1965	Ford et al.	264/275
3,262,272	7/1966	Barakauskas et al.	60/39.05
3,616,101	10/1971	Satchell et al.	161/7
3,989,568	11/1976	Isaac	156/182
4,203,941	5/1980	Brooker	264/250
4,431,193	2/1984	Nesbitt	273/235
4,625,964	12/1986	Yamada	273/62
4,848,770	7/1989	Shama	273/228
4,919,434	4/1990	Saito	273/235 R
4,959,000	9/1990	Giza	425/116

5,002,281	3/1991	Nakahara et al.	273/220
5,006,288	4/1991	Rhodes et al.	264/46.6
5,006,297	4/1991	Brown et al.	264/234
5,072,944	12/1991	Nakahara et al.	273/220
5,112,556	5/1992	Miller	264/279
5,253,871	10/1993	Viollaz	273/228
5,314,187	5/1994	Proudfoot	273/235 R
5,334,673	8/1994	Wu	273/235 R
5,415,937	5/1995	Cadormiga et al.	473/385 X
5,609,535	3/1997	Morgan	473/378 X
5,692,974	12/1997	Wu et al.	473/377

FOREIGN PATENT DOCUMENTS

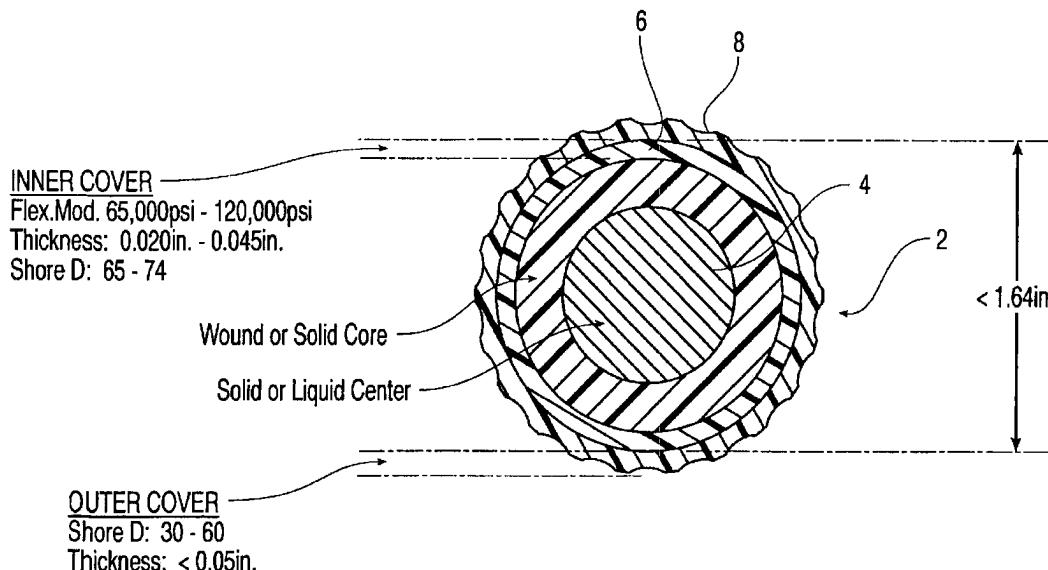
2278609	7/1994	United Kingdom .
2291811	7/1996	United Kingdom .
2291812	7/1996	United Kingdom .
2291817	7/1996	United Kingdom .

Primary Examiner—George J. Marlo
 Attorney, Agent, or Firm—Pennie & Edmonds LLP

[57] ABSTRACT

The present invention is directed towards a multilayer golf ball which comprises a core, an inner cover layer and an outer cover layer, wherein the outer cover layer comprises a thermoset material formed from a castable, reactive liquid, said outer layer having a thickness of less than 0.05 inches and said inner cover layer comprises a high flexural modulus material. The golf balls of the present invention are believed to provide a “progressive performance” from driver to wedge.

18 Claims, 1 Drawing Sheet



U.S. Patent

Mar. 23, 1999

5,885,172

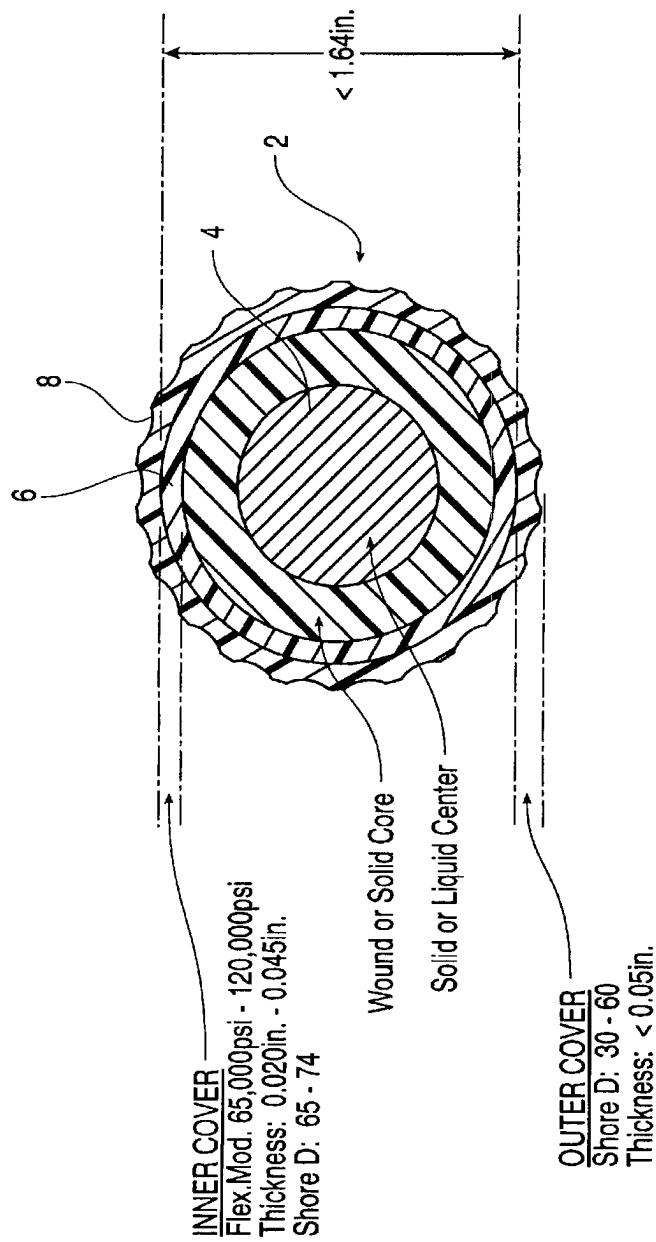


FIG. 1

5,885,172

1

MULTILAYER GOLF BALL WITH A THIN THERMOSET OUTER LAYER

FIELD OF INVENTION

This invention relates generally to golf balls, and more specifically, to a multilayer golf ball. In particular, this invention relates to a golf ball having a core, an inner cover layer and a very thin outer cover layer, wherein the outer cover layer comprises a thermoset material formed from a castable, reactive liquid and the inner cover layer comprises a high flexural modulus material. The multilayer golf balls of the present invention provide "progressive performance" characteristics when struck with golf clubs of varying head speed and loft angle.

BACKGROUND OF THE INVENTION

Until recently golf balls were typically divided into two general types or groups: 1) two piece balls and 2) wound balls (also known as three piece balls). The difference in play characteristics resulting from these different types of constructions can be quite significant.

Balls having a two piece construction are generally most popular with the recreational golfer because they provide a very durable ball while also providing maximum distance. Two piece balls are made with a single solid core, usually formed of a crosslinked rubber, which is encased by a cover material. Typically the solid core is made of polybutadiene which is chemically crosslinked with zinc diacrylate and/or similar crosslinking agents. The cover comprises tough, cut-proof blends of one or more materials known as ionomers such as SURLYN®, which are resins sold commercially by DuPont or Iotek® which is sold commercially by Exxon.

The combination of the above-described core and cover materials provides a "hard" covered ball that is resistant to cutting and other damage caused by striking the ball with a golf club. Further, such a combination imparts a high initial velocity to the ball which results in increased distance. Due to their hardness however, these balls have a relatively low spin rate which makes them difficult to control, particularly on shorter approach shots. As such, these types of balls are generally considered to be "distance" balls. Because these materials are very rigid, many two piece balls have a hard "feel" when struck with a club. Softer cover materials such as balata and softer ionomers in some instances, have been employed in two piece construction balls in order to provide improved "feel" and increased spin rates.

Wound balls typically have either a solid rubber or liquid filled center around which many yards of a stretched elastic thread or yarn are wound to form a core. The wound core is then covered with a durable cover material such as a SURLYN® or similar material or a softer cover such as balata. Wound balls are generally softer than two piece balls and provide more spin, which enables a skilled golfer to have more control over the ball's flight. In particular, it is desirable that a golfer be able to impart back spin to a golf ball for purposes of controlling its flight and controlling the action of the ball upon landing on the ground. For example, substantial back spin will make the ball stop once it strikes the landing surface instead of bounding forward. The ability to impart back spin onto a golf ball is related to the extent to which the golf ball cover deforms when it is struck with a golf club. Because wound balls are traditionally more deformable than conventional two piece balls, it is easier to impart spin to wound balls. However, wound higher spinning balls typically travel a shorter distance when struck as

2

compared to a two piece ball. Moreover, as a result of their more complex structure, wound balls generally require a longer time to manufacture and are more expensive to produce than a two piece ball.

5 The United States Golf Association (USGA) has instituted a rule that prohibits the competitive use in any USGA sanctioned event of a golf ball that can achieve an initial velocity of greater than 76.2 meters per second (m/s), or 250 ft/s, when struck by a driver with a velocity of 39.6 m/s, i.e., 10 130 ft/s (referred to hereinafter as "the USGA test"). However, an allowed tolerance of two percent permits manufacturers to produce golf balls that achieve an initial velocity of 77.7 m/s (255 ft/s).

15 Regardless of the form of the ball, players generally seek a golf ball that delivers maximum distance, which requires a high initial velocity upon impact. Therefore, in an effort to meet the demands of the marketplace, manufacturers strive to produce golf balls with initial velocities in the USGA test that approximate the USGA maximum of 77.7 m/s or 255 ft/s as closely as possible.

20 Therefore, golf ball manufacturers are continually searching for new ways in which to provide golf balls that deliver the maximum performance in terms of both distance and spin rate for golfers of all skill levels.

25 Relatively recently, a number of golf ball manufacturers have introduced multilayer golf balls, i.e., having multiple core intermediate mantle and/or cover layers, in an effort to overcome some of the undesirable aspects of conventional two piece balls, such as their hard feel, while maintaining the positive attributes of these golf balls (including their increased initial velocity and distance). Examples of multilayer balls include the Altus Newing (Bridgestone), Reygrande 2x2, Giga (Spalding) Metal Mix (Dunlop), Ultra Tour Balata (Wilson).

30 35 Additionally, a number of patents have been issued directed towards modifying the properties of a conventional two piece ball by altering the typical single layer core and/or single cover layer construction to provide a multilayer core and/or cover. The inventions disclosed in these patents are directed towards improving a variety of golf ball characteristics.

40 45 For example, there are a number of multilayer ball patents directed towards improving the spin, click or feel of solid balls while maintaining the distance provided by the solid construction. A variety of approaches to manipulating the core construction are described in the art. For example, U.S. Pat. No. 5,072,944 discloses a three-piece solid golf ball having a center and outer layer which are prepared from a rubber composition, preferably having a base rubber of polybutadiene. This patent teaches that it is desirable that the center core is softer than the outer layer, wherein the layers have a hardness (Shore C) of 25–50 and 70–90 respectively.

50 55 U.S. Pat. No. 4,625,964 relates to a solid golf ball having a polybutadiene rubber core of a diameter not more than 32 mm, and a polybutadiene rubber intermediate layer having a specific gravity lower than that of the core material.

60 U.S. Pat. No. 4,848,770 discloses a non-wound three-piece golf ball which includes a core of a highly filled synthetic rubber or polymeric material, an intermediate mantle of an unfilled synthetic rubber and a cover. The core and intermediate mantle have a hardness between 50–95.

65 U.S. Pat. No. 5,002,281 is directed towards a three-piece solid golf ball which has an inner core having a hardness of 25–70 (Shore C) and an outer shell having a hardness of 80–95 (Shore C), wherein the specific gravity of the inner core must be greater than 1.0, but less than or equal to that of the outer shell, which must be less than 1.3.

5,885,172

3

U.S. Pat. No. 5,253,871 concerns a golf ball having a three piece structure comprising an elastomer core, an intermediate layer of a thermoplastic material containing at least 10% of ether block copolymer, preferably blended with an ionomer and a thermoplastic cover.

Several additional patents are directed to golf balls having multiple cover layers. For example U.S. Pat. No. 4,431,193 relates to a golf ball having a multilayer cover wherein the inner layer is a hard, high flexural modulus ionomer resin and the outer layer is a soft, low flexural modulus ionomer resin, wherein either or both layers may comprise a foamed ionomer resin.

U.S. Pat. No. 5,314,187 also relates to golf balls having a cover formed with multiple layers, wherein the outer layer is molded over the inner layer and comprises a blend of balata and an elastomer and the inner layer is an ionomer resin.

U.S. Pat. No. 4,919,434 is directed towards a golf ball having a cover which comprises an inner layer and an outer layer each of which comprise a thermoplastic resin, preferably the layers comprise of materials that are capable of fusion bonding with each other.

UK Patent Application Nos. GB 2,291,817 and 2,291,812 are both directed towards a wound golf ball with improved distance comprising a dual cover layer, wherein the inner cover layer has a high hardness as compared to the outer cover layer. These references teach that the cover layers may be formed from balata or ionomer resins and should have a combined thickness of less than 4 mm.

UK Patent Application No. GB 2,278,609 discloses a multilayer golf ball providing enhanced distance without sacrificing playability or durability comprising a core, an inner cover layer and an outer cover layer wherein the inner cover layer comprises a high acid ionomer and the outer cover layer comprises a soft ionomer or a non-ionomeric thermoplastic elastomer.

However, none of these patents disclose a multilayer ball having a very thin thermoset outer layer formed from a castable reactive liquid as disclosed herein to provide golf balls exhibiting a "progressive performance" such as those golf balls of the present invention.

SUMMARY OF THE INVENTION

The present invention is directed towards a multilayer golf ball which provides "progressive performance" characteristics when struck with golf clubs of varying head speeds and loft angles.

The present invention is further directed towards a multilayer golf ball which in general comprises a core, an inner cover layer and a very thin (i.e., <0.05") outer cover layer, wherein the inner cover layer comprises a high flexural modulus material and the outer cover layer comprises a thermoset material which is formed from a castable reactive liquid material.

In one particular embodiment, the present invention is directed towards a multilayer golf ball which comprises a core, an inner cover layer and a very thin outer cover layer, wherein: a) the core comprises a solid or liquid filled center around which a length of elastic thread is wound; b) the inner cover layer comprises a high flexural modulus material; and c) the outer cover layer comprises a thermoset material which is formed from a castable reactive liquid.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a cross-section of a golf ball 2 having a core 4, an inner cover layer 6 and an outer cover layer 8.

4

DETAILED DESCRIPTION OF THE INVENTION

By the present invention, it has been discovered that a golf ball of the presently claimed construction has a "progressive performance" when struck with a variety of clubs. More specifically, as used herein, the term "progressive performance" means that the presently claimed golf ball has the distance benefits of a traditional hard covered two piece ball when struck with club having a high club head speed and a low loft angle, but also the high spin and feel characteristics similar to that of a traditional soft covered wound ball when struck with a club having a low head speed and high loft angle. Thus, golf balls of the presently claimed construction provide the "best of both worlds" in the golf ball art, i.e., a maximum distance ball for long shots (e.g., with a driver) which has high spin and controllability for short shots (e.g., with a wedge).

Without being limited to any particular theory, it is believed that with low club head speed and high loft shots such as those made with an 8-iron or a wedge, a ball's surface hardness has a greater influence on the ball's flight characteristics than the ball's overall construction. Thus, all other parameters being equal, a ball with a softer surface will have a higher spin rate than one with a harder surface, regardless of the ball's overall construction. Conversely, however, when a golf ball is struck with a high club head speed and a low loft angle, such as that of a driver, it appears that the opposite is true and that the overall construction of the ball has a greater influence on the ball's flight characteristics than does the surface hardness.

Accordingly, by the present invention, it has been found that by creating a golf ball with a low spin construction, but adding a very thin layer of a relatively soft thermoset material formed from a castable reactive liquid, a golf ball with "progressive performance" from driver to wedge can be formed. As used herein, the term "thermoset" material refers to an irreversible, solid polymer that is the product of the reaction of two or more prepolymer precursor materials.

The invention is particularly directed towards a multilayer golf ball which comprises a core, an inner cover layer and an outer cover layer. The thickness of the outer cover layer is critical to the "progressive performance" of the golf balls of the present invention. If the outer cover layer is too thick, this cover layer will contribute to the in-flight characteristics related to the overall construction of the ball and not the cover surface properties. However, if the outer cover layer is too thin, it will not be durable enough to withstand repeated impacts by the golfer's clubs. Specifically, it has been determined that the outer cover layer must have a thickness of less than about 0.05 inches, preferably between about 0.02 and about 0.04 inches. Most preferably, this thickness is about 0.03 inches.

The outer cover layer is formed from a relatively soft thermoset material in order to replicate the soft feel and high spin play characteristics of a balata ball when the balls of the present invention are used for pitch and other "short game" shots. In particular, the outer cover layer should have a Shore D hardness of from about 30 to about 60, preferably 35-50 and most preferably 40-45. Additionally, the materials of the outer cover layer must have a degree of abrasion resistance in order to be suitable for use as a golf ball cover.

The outer cover layer of the present invention can comprise any suitable thermoset material which is formed from a castable reactive liquid material. The preferred materials for the outer cover layer include, but are not limited to, thermoset urethanes and polyurethanes, thermoset urethane

ionomers and thermoset urethane epoxies. Examples of suitable polyurethane ionomers are disclosed in co-pending U.S. patent application Ser. No. 08/482,519, filed Jun. 7, 1995, entitled "Golf Ball Covers", the disclosure of which is hereby incorporated by reference in its entirety in the present application.

Thermoset polyurethanes and urethanes are particularly preferred for the outer cover layers of the balls of the present invention. Polyurethane is a product of a reaction between a polyurethane prepolymer and a curing agent. The polyurethane prepolymer is a product formed by a reaction between a polyol and a diisocyanate. The curing agent is typically either a diamine or glycol. Often a catalyst is employed to promote the reaction between the curing agent and the polyurethane prepolymer.

Conventionally, thermoset polyurethanes are prepared using a diisocyanate, such as 2,4-toluene diisocyanate (TDI) or methylenebis-(4-cyclohexyl isocyanate) (HMDI) and a polyol which is cured with a polyamine, such as methylenedianiline (MDA), or a trifunctional glycol, such as trimethylol propane, or tetrafunctional glycol, such as N,N,N',N'-tetrakis(2-hydroxypropyl)ethylenediamine. However, the present invention is not limited to just these specific types of thermoset polyurethanes. Quite to the contrary, any suitable thermoset polyurethane may be employed to form the outer cover layer of the present invention.

The inner cover layer of the present invention is formed from a hard, high flexural modulus, resilient material which contributes to the low spin, distance characteristics of the presently claimed balls when they are struck for long shots (e.g. driver or long irons). Specifically, the inner cover layer materials have a Shore D hardness of about 65-80, preferably about 69-74 and most preferably about 70-72. Furthermore, as defined herein, the term "high flexural modulus" means a flexural modulus (as measured by ASTM 790) of at least about 65,000 psi, preferably about 70,000 psi to about 120,000 psi and most preferably at least about 75,000 psi. The thickness of the inner cover layer can range from about 0.020 inches to about 0.045 inches, preferably about 0.030 inches to about 0.040 inches and most preferably about 0.035 inches.

The inner cover layer may be formed from a wide variety of hard, high flexural modulus resilient materials. Among the preferred inner cover materials are hard, high flexural modulus ionomer resins and blends thereof. These ionomers are obtained by providing a cross metallic bond to polymers of monoolefin with at least one member selected from the group consisting of unsaturated mono- or di-carboxylic acids having 3 to 12 carbon atoms and esters thereof (the polymer contains 1 to 50% by weight of the unsaturated mono- or di-carboxylic acid and/or ester thereof). More particularly, such acid-containing ethylene copolymer ionomer component includes E/X/Y copolymers where E is ethylene, X is a softening comonomer such as acrylate or methacrylate present in 0-50 (preferably 0-25, most preferably 0-20), weight percent of the polymer, and Y is acrylic or methacrylic acid present in 5-35 (preferably at least about 16, more preferably at least about 16-35, most preferably at least about 16-20) weight percent of the polymer, wherein the acid moiety is neutralized 1-90% (preferably at least 40%, most preferably at least about 60%) to form an ionomer by a cation such as lithium*, sodium*, potassium, magnesium*, calcium, barium, lead, tin, zinc* or aluminum (*=preferred), or a combination of such cations. Specific acid-containing ethylene copolymers include ethylene/acrylic acid, ethylene/methacrylic acid, ethylene/acrylic acid/n-butyl acrylate, ethylene/methacrylic acid/n-butyl

acrylate, ethylene/methacrylic acid/iso-butyl acrylate, ethylene/acrylic acid/iso-butyl acrylate, ethylene/methacrylic acid/n-butyl methacrylate, ethylene/acrylic acid/methyl acrylate, ethylene/methacrylic acid/methyl acrylate, ethylene/methacrylic acid/methyl methacrylate, and ethylene/acrylic acid/n-butyl methacrylate. Preferred acid-containing ethylene copolymers include ethylene/methacrylic acid, ethylene/acrylic acid, ethylene/methacrylic acid/n-butyl acrylate, ethylene/methacrylic acid/methyl acrylate and ethylene/acrylic acid/methyl acrylate copolymers. The most preferred acid-containing ethylene copolymers are ethylene/methacrylic acid, ethylene/acrylic acid, ethylene/(meth)acrylic acid/n-butyl acrylate, ethylene/(meth)acrylic acid/ethyl acrylate, and ethylene/(meth)acrylic acid/methyl acrylate copolymers

The manner in which the ionomers are made is well known in the art as described in e.g., U.S. Pat. No. 3,262,272. Such ionomer resins are commercially available from DuPont Co. under the tradename SURLYN® and from Exxon under the tradename Iotek®. Some particularly suitable SURLYNS® include SURLYN® 8140 (Na) and SURLYN® 8546 (Li) which have an methacrylic acid content of about 19%.

However, the materials for the inner cover layer are not limited to ionomer resins. Instead, the present invention contemplates that virtually any hard, high flexural modulus, resilient material which is compatible with the other materials of the golf ball may be employed as the inner cover layer. Examples of other suitable inner cover materials include thermoplastic or thermoset polyurethanes, thermoplastic or thermoset polyetheresters or polyetheramides, thermoplastic or thermoset polyester, a dynamically vulcanized elastomer, a functionalized styrenebutadiene elastomer, a metallocene polymer or blends thereof.

Suitable thermoplastic polyetheresters include materials which are commercially available from DuPont under the tradename Hytrel®. Suitable thermoplastic polyetheramides include materials which are available from Elf-Atochem under the tradename Pebax®. Other suitable materials for the inner cover layer include nylon and acrylonitrile-butadiene-styrene copolymer (ABS).

The golf ball cores of the present invention may comprise any of a variety of constructions. For example, the core of the golf ball may comprise a conventional center surrounded by an intermediate mantle layer disposed between the center and the inner cover layer. The core may be a single layer or may comprise a plurality of layers. The innermost portion of the core may be solid or it may be a liquid filled sphere. As with the core, the intermediate mantle layer may also comprise a plurality of layers. The core may also comprise a solid or liquid filled center around which many yards of a stretched elastic thread or yarn are wound.

The materials for solid cores include compositions having a base rubber, a crosslinking agent, a filler, and a co-crosslinking or initiator agent. The base rubber typically includes natural or synthetic rubbers. A preferred base rubber is 1,4-polybutadiene having a cis-structure of at least 40%. If desired, the polybutadiene can also be mixed with other elastomers known in the art such as natural rubber, polyisoprene rubber and/or styrene-butadiene rubber in order to modify the properties of the core.

The crosslinking agent includes a metal salt of an unsaturated fatty acid such as a zinc salt or a magnesium salt of an unsaturated fatty acid having 3 to 8 carbon atoms such as

5,885,172

7

acrylic or methacrylic acid. Suitable cross linking agents include metal salt diacrylates, dimethacrylates and monomethacrylates wherein the metal is magnesium, calcium, zinc, aluminum, sodium, lithium or nickel.

The initiator agent can be any known polymerization initiator which decomposes during the cure cycle. Suitable initiators include peroxide compounds such as dicumyl peroxide, 1,1-di(t-butylperoxy) 3,3,5-trimethyl cyclohexane, a—a bis (t-butylperoxy) diisopropylbenzene, 2,5-dimethyl-2,5 di(t-butylperoxy) hexane or di-t-butyl peroxide and mixtures thereof.

Conventional prior art golf balls typically incorporate 5 to 50 pph of zinc oxide in a diacrylateperoxide core system. However, the zinc oxide may be replaced by calcium oxide in a diacrylate-peroxide system to provide a suitable core composition.

As used herein, the term "filler" includes any compound or composition that can be used to vary the density and other properties of the core. Fillers typically includes materials such as zinc oxide, barium sulfate, silica, calcium carbonate, zinc carbonate reground (recycled core material ground to 30 mesh particle) and the like.

In one embodiment of the present invention, the core comprises a center which is liquid-filled or solid around which an elastic thread is wound. The solid center is typically a homogenous mass of a resilient material such as polybutadiene or a natural rubber. The liquid-filled center is typically a thin walled sphere made from a thermoplastic or thermoset material into which a liquid such as corn syrup is injected by means of a needle. The sphere is then sealed and typically frozen to make the core a solid mass. The windings for either type of center are provided by an elastic thread which is stretched and wound about the core to a desired thickness.

The overall outer diameter (OD) of the core (including the center and any intermediate mantle layer(s) or windings) together with the inner cover layer of the golf balls of the present invention is about 1.580 inches to about 1.640 inches, preferably about 1.60 inches to about 1.630 inches, and most preferably about 1.620 inches.

The present multilayer golf ball can have an overall diameter of any size. Although the United States Golf Association (USGA) specifications limit the minimum size of a competition golf ball to more than 1.680 inches in diameter, there is no specification as to the maximum diameter. Moreover, golf balls of any size can be used for recreational play. The preferred diameter of the present golf balls is from about 1.680 inches to about 1.800 inches. The more preferred diameter is from about 1.680 inches to about 1.760 inches. The most preferred diameter is about 1.680 inches to about 1.740 inches.

The cores and inner cover of the golf balls of the present invention can be made by any conventional process employed in the golf ball art. For example, the solid centers can be either injection or compression molded. Similarly, the wound centers employed in the present invention can be produced through conventional means. The inner cover layer and any mantle layer(s) are subsequently injection or compression molded about the core.

However, due to the very thin nature (less than 0.05"), it is not practical to form the outer cover layers of the ball of the present invention using conventional injection or compression molding techniques ordinarily employed in the golf ball art for applying cover materials. These conventional ball molding processes are not capable of easily applying such thin outer cover layers over a solid spherical surface.

8

Accordingly, it has been found by the present invention that the use of a castable, reactive material which is applied in a fluid form makes it possible to obtain very thin outer cover layers on golf balls. Specifically, it has been found that castable, reactive liquids which react to form a thermoset material provide desirable very thin outer cover layers.

The castable, reactive liquid employed to form the thermoset material can be applied over the inner core using a variety of application techniques such as spraying, dipping, spin coating or flow coating methods which are well known in the art. An example of a suitable coating technique is that which is disclosed in co-pending U.S. patent application Ser. No. 08/432,657, filed May 2, 1995 entitled "Method And Apparatus For Forming Polyurethane Cover On A Golf Ball", the disclosure of which is hereby incorporated by reference in its entirety in the present application. Similarly, U.S. Pat. No. 5,006,297 to Brown et al. and U.S. Pat. No. 5,334,673 to Wu both also disclose suitable coating techniques which may be utilized to apply the castable reactive liquids employed in the present invention. The disclosures of these patents are hereby incorporated by reference in their entirety. However, the method of the invention is not limited to the use of these techniques.

The following example of multilayer golf balls formed according to the present invention is given to illustrate the present invention. However, it is to be understood that the example is for illustrative purposes only and in no manner is the present invention limited to the specific disclosures therein.

EXAMPLE 1

Golf balls of the present invention can be manufactured as follows. The core may be made using either a conventional wound core construction or a conventional twopiece core construction formed using methods well known in the art. The wound core construction can be either a solid rubber-based center or a liquid filled center around which a length of elastic thread is wound. A conventional two-piece construction preferably comprises a cis 1,4 polybutadiene rubber that has been crosslinked with a metal salt of an unsaturated fatty acid such as zinc diacrylate.

These core constructions are then covered using a conventional compression molding technique with an inner cover layer of an ionomer having a methacrylic acid content of at least about 16 weight percent (preferably SURLYN 8140 or SURLYN 8546).

The outer cover layer can be formed following the processes set forth in U.S. Pat. No. 5,006,297 and U.S. Pat. No. 5,334,673. A particularly desired material for forming the outer cover layer is 40D castable urethane.

It is believed that golf balls made in accordance with the present invention will exhibit an appreciably lower spin rate when struck with a driver (and thus a greater overall distance) as compared to conventional "high performance" golf balls (e.g. Tour Balata [Titleist]), but have very similar or even higher spin rates when struck with an 8 iron and/or a "50 yard" wedge, thereby evidencing a "progressive performance" from driver to wedge in the golf balls of the present invention.

While it is apparent that the illustrative embodiments of the invention herein discloses fulfills the objective stated above, it will be appreciated that numerous modifications and other embodiments may be devised by those skilled in the art. Therefore, it will be understood that the appended claims are intended to cover all such modifications and embodiments which come within the spirit and scope of the present invention.

5,885,172

9

We claim:

1. A golf ball comprising a cover and a core, wherein said cover is disposed about the core and said cover comprises:
 - (a) an inner cover layer of a flexural modulus of at least about 65,000 psi; and
 - (b) an outer cover layer having a Shore D hardness of greater than 30 to 60, having a thickness of less than 0.050 inches and comprising a thermoset material that includes at least one of a castable reactive liquid material and reaction products thereof.
2. The golf ball of claim 1, wherein the outer layer has a Shore D hardness of less than 60.
3. The golf ball of claim 1, wherein the outer layer has a Shore D hardness of between 35 to 50.
4. The golf ball of claim 3, wherein the inner layer has a flexural modulus of from 70,000 to 120,000 psi.
5. The golf ball of claim 4, wherein the inner layer has a Shore D hardness of 69 to 74.
6. The golf ball of claim 1, wherein the inner layer has a Shore D hardness of at least 65.
7. The golf ball of claim 1, wherein the thermoset material comprises a material selected from the group consisting of a polyurethane, a urethane ionomer and a urethane epoxy.
8. The golf ball of claim 1 wherein the inner cover layer comprises an ionomer resin, a polyurethane, a polyetherester, a polyetheramide, a polyester, a dynamically vulcanized elastomer, a functionalized styrenebutadiene elastomer, a metallocene polymer nylon, acrylonitrile butadiene-styrene copolymer or blends thereof.
9. The golf ball of claim 8, wherein the inner cover layer comprises an ionomer resin which comprises at least 16 wt. percent of carboxylic acid.
10. The golf ball of claim 1, wherein the outer diameter of the core and the inner cover layer is less than 1.640 inches.

10

11. A golf ball comprising a cover and a core, wherein:
 - (a) the cover comprises an inner cover layer and an outer cover layer;
 - (b) said inner cover layer comprises an ionomer resin having a flexural modulus of at least 65,000 psi;
 - (c) said outer cover layer has a thickness of 0.02 inches to 0.045 inches and comprises a polyurethane formed from a castable, reactive liquid material.
12. The golf ball of claim 11, wherein the core comprises a liquid filled center.
13. The golf ball of claim 12, wherein the core comprises a center around which a length of elastic thread is wound.
14. The golf ball of claim 13, wherein the inner cover layer comprises an ionomer.
15. A golf ball comprising a cover and a core, wherein:
 - (a) the cover comprises an inner cover layer and an outer cover layer;
 - (b) said inner cover layer comprises an ionomer having a flexural modulus of at least 65,000 psi and a thickness of 0.035 inches; and
 - (c) said outer cover layer has a thickness of 0.030 inches and comprises a polyurethane formed from a castable, reactive liquid.
16. The golf ball of claim 15, wherein the core comprises a solid sphere.
17. The golf ball of claim 15, wherein the core comprises a solid center around which a length of elastic thread is wound.
18. The golf ball of claim 15, wherein the core comprises a liquid filled center around which a length of elastic thread is wound.

* * * * *

Exhibit J

#3
9-11-98
TC

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

SEP 10 1998

Application of: HEBERT et al.

Serial No.: 08/863,789

Group Art Unit: 3711

Filed: May 27, 1997

Examiner: Marlo, G.

For: MULTILAYER GOLF BALL WITH A
THIN THERMOSET OUTER LAYER

Attorney Docket No.: 174-511

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Pursuant to applicants' duty of disclosure under 37 C.F.R. 1.56, enclosed are copies of 23 references for the Examiner's review and consideration. These references are listed on the enclosed PTO Form 1449.

These references either were uncovered during various patentability searches for this invention or are references from co-pending applications 08/482,519 and 08/432,657. None are deemed to be material to the patentability of the present invention. It is respectfully requested that these references be made of record in this application by the Examiner's completion and return of the PTO Form 1449.

A fee of \$130.00 is believed to be due for this submission, which may be charged to Pennie & Edmonds LLP Deposit Account No. 16-1150. Should any additional fees be required, please charge such fees to the same account.

Respectfully submitted,

E. Bradley Gould

Date: September 10, 1998

For Harry C. Jones, III
E. Bradley Gould (Reg. No. 41,792)
For: Harry C. Jones, III (Reg. No. 20,280)

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Washington, DC 20006
(202) 496-4000

Enclosure

Exhibit K

Sheet 1 of 2

LIST OF REFERENCES CITED BY APPLICANT <i>(Use several sheets if necessary)</i>				ATTY DOCKET NO.	APPLICATION NO.		
				APPLICANT		08/863,788	
 SEP 1 1998				Edmund A. HEBERT			
				FILING DATE	GROUP		
				May 27, 1997	3711		
U.S. PATENT DOCUMENTS							
*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
EDM	AA	3,147,324	9/1/64	Ward	264	254	
EDM	AB	3,177,280	4/6/65	Ford, et al.	264	275	
EDM	AC	3,262,272	7/26/66	Barakauskas, et al.	60	39.05	
EDM	AD	3,616,101	10/26/71	Satchell, et al.	161	7	
EDM	AE	3,989,568	11/2/76	Isaac	156	182	
EDM	AF	4,203,941	5/20/80	Brooker	264	250	
EDM	AG	4,431,193	2/14/84	Nesbitt	273	235	
EDM	AH	4,625,964	12/2/86	Yamada	273	62	
EDM	AI	4,848,770	7/18/89	Shama	273	228	
EDM	AJ	4,919,434	4/24/90	Saito	273	235 R	
EDM	AK	4,959,000	9/25/90	Giza	425	116	
EDM	AL	5,002,281	3/26/91	Nakahara, et al.	273	220	
EDM	AM	5,006,288	4/9/91	Rhodes, et al.	264	46.6	
EDM	AN	5,006,297	4/9/91	Brown, et al.	264	234	
EDM	AO	5,072,944	12/17/91	Nakahara, et al.	273	220	
EDM	AP	5,112,556	5/12/92	Miller	264	279	
EDM	AQ	5,253,871	10/19/93	Viollaz	273	228	
EDM	AR	5,314,187	5/24/94	Proudfoot	273	235 R	
EDM	AS	5,334,673	8/2/94	Wu	273	235 R	
	AT						
FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
							YES NO
EDM	AU	GB 2,278,609	7/12/94	United Kingdom	—	—	

Examiner: George J. MARLO Date Considered: 10-8-98

08/863,788

Sheet 2 of 2

<i>20M</i>	AV	GB 2,291,811	7/2/96	United Kingdom	—	—	—
<i>20M</i>	AW	GB 2,291,812	7/2/96	United Kingdom	—	—	—
<i>20M</i>	AX	GB 2,291,817	7/2/96	United Kingdom	—	—	—
	AY				—	—	—
<i>OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)</i>							
	AZ	SEP 10 1990					
	BA	<i>CONFIDENTIAL</i>					
	BB						
EXAMINER <i>George J MARLO</i>				DATE CONSIDERED <i>10-8-98</i>			
<small>*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</small>							